Psychomotor Dance Therapy Intervention (DANCIN) for people with dementia in care homes

Psychomotor Dance Therapy Intervention (DANCIN) for people with dementia in care homes: a multiple-baseline single case study

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Abstract

Background: A Psychomotor DANCe Therapy INtervention (DANCIN) using Latin Ballroom (Danzón) in care homes has previously been shown to enhance well-being for both residents with dementia and staff. The aim of this study was to understand the effect of this approach on the mood and behaviour of individual people living with mild to moderate dementia.

Method: A multiple-baseline single case study across 2 care homes and 1 nursing home with 3-6 weeks baseline, 12-weeks DANCIN (30 minutes/twice-weekly sessions) and 12-weeks follow-up was conducted. Seventeen items from the Dementia Mood Assessment Scale outcome measure (DMAS) were adapted with input from senior staff to match participants' behaviour and mood symptoms. Daily monitoring diaries were collected from trained staff on reporting individualised items for ten residents with mild to moderate dementia. Data were analysed, using a non-parametric statistical method known as Percentage of All Non-Overlapping Data (PAND) which provides Phi effect size. Medication use, falls and life events were registered.

Results: Seven residents participated throughout the Psychomotor Dance Therapy whilst three became observers owing to health deterioration. One participant showed adverse effects in three DMAS items. Nine participants, dancers and observers, showed a small to medium magnitude of change (PAND) in twenty-one DMAS items, indicating a decrease in the frequency of behaviour and mood indices which were regarded as problematic; eight items showed no change.

Conclusion: Despite methodological challenges, the DANCIN model has the potential to facilitate and sustain behaviour change and improve mood (e.g. decrease irritability, depressed appearance, increase self-esteem) of the residents living with dementia. The study was conducted in two care homes and one nursing home, strengthening the interventions' validity. Findings suggest DANCIN is appropriate for a larger controlled feasibility study.

Key words: dementia; dancing; psychomotor dance therapy; staff-training; long-term care; mood; behaviour-change; psychosocial.

Introduction

Care home staff often follow rigorous routines from day to night, usually spending more time engaged in personal care tasks than promoting activity and stimulation (Froggatt and Parker, 2010). In the UK, the English and Scottish National Dementia Strategies outline the need to improve the quality of care in care homes (Department of Health, 2009; Scottish Government, 2013). Forty-six million people live with dementia worldwide, bringing an estimate economic impact of US $818 billion (Prince et al., 2015). There are over 18,000 care homes in England providing care for over 386, 000 people (ENRICH, 2015). Psychosocial Interventions have shown to improve well-being in care homes, through theatre activities (van Haeften-van Dijk, et al., 2014); cognition with Cognitive Stimulation Therapy (Spector et al., 2003); and to reduce agitation with Music Therapy (Sung et al., 2012). A recent systematic review of non-pharmacological interventions to reduce agitation in dementia (Livingston et al., 2014) showed that Music Therapy was effective; however there was no mention of Dance Therapies, neither within the context of art/exercise-based activities nor in "body oriented" Psychological Therapies (Loew et al. 2006; Kelly, 2014).

Theoretical background

Dance research with healthy older adults has been shown to be effective in improving social activity and physical health (Bertram and Stickley, 2007; Silva Lima and Pedreira Vieira, 2007) and well-being (Keogh et al. 2012). Dance is multi-dimensional: music, body movement, sensory and social elements are involved, whilst the interaction between the brain and behaviour suggests the possibility of increasing human brain plasticity (Karpati et al., 2015). The current study applies Psychomotor Therapy, widely practised in the Netherlands to improve the health of older people (Dröes, 1997), and a core approach for improving residential dementia care in Objective 5, Measure No. 17 of the French 'Plan Alzheimer's' (2008-2012). Previous sport-based psychomotor interventions in dementia (Hopman-Rock et al. 1999) found beneficial effect on cognition ($N=134$ $p<0.05$ compared to control group) and increased positive group behaviour. Psychomotor Dance Therapy using African rhythms in

healthy older women (Tupinier, 2009) described anecdotal improvements in quality of life, interaction, restlessness and agitation. A previous study using motion capture and ground reaction force recordings to analyse a 30-minute Danzón lesson with elements from Psychomotor Dance Therapy (Guzmán-García et al., 2011) found significant reductions in variability of sway normalised by body height on healthy non-dancer older adults (Guzmán-García et al., 2011) This suggested that learning Danzon at a beginner's level was beneficial for balance, despite the increased cognitive load in the early stages of skill acquisition.

Most geriatric healthcare interventions are complex interventions due to the highly heterogeneous population (Faes et al., 2010). We followed the Medical Research Council (MRC) Framework (Craig et al., 2008) to inform the development of this Psychomotor Dance Therapy Intervention (DANCIN) in care homes. The current study is the continuation of MRC-Phase I: development, point 2 to 4 of the CReDECI checklist (Möhler et al., 2015). Firstly, we conducted a systematic literature review of dancing in dementia in care settings (Guzmán-García et al. 2012a). We found potential benefits, including a decrease in behaviours, improvements in mood and increase in physical activity. The review highlighted three small randomised control trials using: Dance Therapy (Rösler et al., 2002) and Dance Movement Therapy (Hokkanen et al., 2003; Hokkanen et al., 2008). These studies showed small significant changes in visuospatial skills and mobility, but no investigation of behavioural or emotional measures was undertaken. Most studies found in the review had weak methodology with limited discussion on the processes of impact on behaviour and psychological symptoms.

Second, DANCIN was then investigated using a qualitative testing through grounded theory methodology after a six-week pilot sessions (Guzmán-García et al., 2012b). Two theoretical models from staff and residents showed that residents living with dementia enjoyed the twice-weekly sessions. Both staff and residents mentioned that DANCIN was targeting mainly their behaviour and mood. For example: "...I just can say that if you are feeling miserable and you

dance, it cheers you up..."; "I would not worry as long as I am enjoying myself, get on well with other dancers and don't whinge" (p. 8, Guzmán-García et al., 2012b). The development and evaluation of DANCIN follows the MRC-Framework (Craig et al., 2008). According to this, the present study is part of the first phase of the framework: development of a complex intervention. Hence, it aims at investigating the effect of DANCIN on the behaviour and mood at the individual level of nursing home residents by applying a single-case study design.

Owing to the aims Single-Case Research (SCR) methodology was employed, as such a design provides an estimate of the personal variability of the effect, which cannot be distinguished from the data in a conventional parallel group trial. It might imply a small sample as found in previous dementia Dance Therapies studies, however SCR will provide a robust methodology to chart complex changes occurring within individuals over time (Blampied, 1999; Blampied, 2013) or when asking if an intervention is more effective than the current "baseline" or "treatment-as-usual condition" (Kratochwill et al., 2010) and can be helpful during the development of an intervention (Vernooij-Dassen & Moniz-Cook, 2014). Previous SCR in dementia has shown significant benefits in terms of decreasing behaviours which were challenging at meal times and during self-care tasks (Moniz-Cook et al., 2003); and reducing agitation using aromatherapy with massage (Brooker et al., 1997).

Methods

Design

We conducted a Multiple-baseline Single-Case Research study with three phases A-B-C. Phase A comprised a staggered baseline of varied length (from 3-6 weeks). A larger number of baselines strengthens the design when variables are likely to fluctuate greatly (Barlow et al., 2009). We predicted that the pattern of fluctuating behaviour and mood in dementia would require a minimum of three weeks observation for sufficient comparisons (Ottenbacher, 1997) and a maximum of six weeks of intervention. This variation was observed in the qualitative pilot study (Guzmán-García et al., 2012b).

Phase B was the 12-weeks DANCIN and Phase C comprised naturalistic follow-up observation (12-weeks). We surmised that the emergent patterns of behaviour would require at least as long a period of follow-up as the intervention itself to allow sufficient and realistic comparisons to be made.

Randomisation and Ethics

The study was approved by the Research and Development Newcastle-upon-Tyne and Wear National Health System (NHS) Trust department and with the Integrated Research Application System (IRAS) Ethics Committee [Reference Number 09/H090674] in Newcastle upon Tyne, England, United Kingdom. A necessary amendment was notified and approved by the Ethics department: (24642/108056/1/483) owing to some participants becoming observers. An external researcher to this study randomised the participants to baselines. As the initial sample was of eleven residents, a random number generator on Statistical Package for the Social Sciences (SPSS, version 17) was used to generate number sequences which were then used to allocate three blocks of three participants and one block of the two participants to one of the four baselines. In the three care settings, three residents were assigned to 6-weeks (42 day observations), three residents to 5-weeks (35 day observations), three residents to 4-weeks (28 day observations) and one resident to 3-weeks baselines (21 day observations). Participants started baseline measures at different times and the intervention began at the same time in all care homes.

Settings and Participants

Care homes were selected in accordance with the Transparent Reporting of Evaluations with Nonrandomised Designs (TREND) guideline for reporting of non-randomised group trials (Des Jarlais et al., 2004). Firstly a list of potential homes was provided by member of a specialist Challenging Behaviour Team, working in the North East of England. Eight private residential and nursing care homes were identified. [In the UK, a residential care home usually provides care to people with dementia that do not require specialised 24/7 nursing care. A Nursing home provides specialised medical service. Once settings were identified, participants were

approached by the manager and senior care during conversations at the care home. A DANCIN taster invitation was given to those homes expressing an interest in participating. Inclusion criteria for settings were*:* i) care/nursing homes with no regular dancing activity or exercise to music during the study period; ii) a spacious well ventilated room to both perform the dance and accommodate a group of 10 people (e.g. dining room); iii) staff available to commit to the requirements of the study. The inclusion criteria for participants were: i) a formal diagnosis dementia of any type, in mild to moderate stages confirmed from care/nursing home medical notes or previous assessment such as the Mini Mental State Examination (MMSE) ≥12 (Folstein et al., 1975); ii) ability to give consent to take part in the study; iii) ability to walk independently; and iv) low risk of falls according to the Tinetti Balance Tool (Tinetti et al., 1986) cut off value of gait and balance overall score of 18 points.

Two residential care homes and 1 nursing home met inclusion criteria and 18 residents indicated interest; only twelve fulfilled all the criteria for recruitment. One resident died prior to starting the study, one participant withdrew consent following recruitment. A total of 10 residents (six women, four men) commenced the study. Five were from care home A (residential); four from home B (residential) and one from C (nursing). Homes B and C were interlinked, then, five residents joined together in this nursing care setting. Thirty two staff members across the three homes (22 female; 10 male) took part in this study, four danced and scored; ten observed and scored; 13 only danced and five only observed. Residents and Staff demographic information are summarised in Table 1 and Table 2 respectively.

Intervention

Content

The intervention was designed based on the Psychomotor Therapy framework and Danzón Latin Ballroom was selected as the core dance rhythm. Danzón originated from the English Contra Dance, it is performed at a slow-to-moderate speed with small steps in which the feet slide or drag and stop on each beat along with gentle hip and body movements. These movements contrast with tango or foxtrot, which involve stylised walking with strong lifted marked steps between beats (Flores y Escalante, 2006).

Psychomotor Therapy approach involves three dimensions: i) Motor (balance, fast/slow interpersonal coordination, hand-grip, gesture and facial expression); ii) Emotional-Affective (feeling expression, verbal and non-verbal communication); and iii) Cognitive (planning movement in space), with the aim of using movement activities and paying attention to bodily experiences (Wallon, 1932; Dröes, 1997; Calmels, 2003; Probst et al., 2010). The approach is usually complemented by hand by hand touch, relaxation and breathing techniques (Camacho and Paolillo, 2004). Additionally, arm-chair exercises to warm-up and cool down, and four simplified Danzón Latin Ballroom choreographies were practiced for staff to repeat with residents at each week of the study. Table 3 shows key components of the DANCIN session.

'Insert Table 3 here'

Delivery

DANCIN sessions were arranged twice-weekly for 30 minutes between 14:00 to 15:30 pm with the aim to deliver a total of 24 sessions in each setting. The intervention was led by the first author (Clinical Psychologist with background in Psychomotor Therapy) with staff invited to participate as facilitators. DANCIN staff training was delivered for a small group of 3-5 staff members, including activity coordinators at each setting in a two-hour session. Staff willing to facilitate the session did not require professional dance experience, but a rhythmic response to music was required. DANCIN staff training involved using a theoretical and practical presentation, comprising eight units: 1) the Psychomotor Therapy principles; 2) information on

the effects of dancing in dementia based on the findings of the systematic review (Guzmán-García et al., 2012a); 3) effect of antipsychotic medication on dementia; 4) music and rhythmicity; 5) DANCIN session structure; 6) safety considerations whilst dancing; 7) performing techniques and movement adaptations and 8) modelling how to feedback the experience after each session.

Staff were encouraged to sit after each DANCIN session and ask residents to share their feelings after taking part in DANCIN. For example, take note of reactions and opinions, verbal and non-verbal, were discussed within the dance group. DANCIN qualitative findings showed that some residents might start reminiscing about their youth linked to the experience of dance; some residents might recognise the 'stiffness' of their bodies and the need for exercising. Staff were encouraged to ask residents with previous dancing experience to help and lead at certain points of the session. Experiences from residents and staff are acknowledged and validated by the dance group, including the observers were taking part by chair-based adaptation moves.

Material

Laptop for power point presentation and back up storage of Danzón Music, music recorder with speakers, two video cameras and tripods, two manuals with photographic material of the choreographies as mnemonic aid to cue participants.

Activities to increase adherence

A certificate of achievement was given to the ten residents that completed the study, to staff that facilitated the dance sessions and to staff that supported with the behaviour/mood data diaries.

Measures

Home managers were sent an invitation letter and given time to consider participation. Managers approached staff before the researcher; similarly, residents were approached by the staff to assess their willingness to participate. Participants were interviewed using the Mental Capacity Act (2005) and Consent Pathway framework in England that protects the rights of people who may not be able to provide informed consent. Potential residents and staff participants had the opportunity to read an information leaflet, then, researcher (first author) sought consent. Once consent was given, screening measures were administered by the first author at the settings.

Screening Measures

The Mini Mental State Examination (MMSE) (Folstein et al., 1975) was used to confirm levels of cognitive impairment. The Tinetti Balance Assessment Tool-Frail Adult version (Tinetti et al., 1986) to assess mobility. This latter version contains gait and balance sections such that combined scores provide a risk of falls assessment.

Outcome Measure

The Dementia Mood Assessment Scale (DMAS-17) (Sunderland et al., 1988) was selected as it contains items related to mood and behaviour relevant to the aim of this study. The DMAS-17 has a 6-point scale: 0=none, 2=occasionally, 4= frequently, 6=severe. It takes 15 minutes to complete and utilises language accessible to staff when describing resident's behaviour.

Single items from DMAS were selected by senior staff in each care setting for each participant and investigated as outcomes. The DMAS-17 items include: Self-Directed Motor Activity; Sleep (insomnia or daytime drowsiness); Appetite (increase or decrease); Psychosomatic Complaints; Energy; Irritability; Physical Agitation; Anxiety; Depressed Appearance; Awareness of Emotional State; Emotional Responsiveness; Sense of Enjoyment; Self-esteem; Guilt-Feelings; Hopelessness/Helplessness; Suicidal Ideation; and Speech. The scale has high inter-rater reliability and it is validated against the Geriatric Depression Scale (GDS) and Hamilton depression scale (Sunderland and Minichiello, 1996).

Then, an interview was conducted with the senior care staff member familiar with the needs of individual residents. The purpose of the initial interview was to generate bespoke target items from the DMAS-17 for daily measurement. For each participant, a minimum of two items were chosen where it was identified that they would generally occur three or more times per week. Selection of targets was based on: i) items important to the resident or to people close to the resident; ii) actions that might be dangerous or distressing to the person or others; iii) behaviours that interfered with the resident's functioning. Selected DMAS-17 items were discussed with participants as a reminder of their goals during DANCIN.

The outcome measure was the individualised behaviour and mood monitoring diaries scored by care staff during Phase A and B. Diaries were collected daily and secured by the researcher to avoid staff looking at previous scoring trends. Sessions were led and video-recorded to ensure fidelity of the intervention. Two staff members were required to facilitate DANCIN for a group of six residents (including non-dancing observers). During the 12-week follow-up, Phase C, in order to minimise the burden on staff, data were collected by weekly phone calls. Settings were allowed to pursue whatever activity suited them during the follow-up period. For the purposes of comparison, it was preferred if homes did not dance. See Figure S1 of study protocol published as supplementary material online attached to the electronic version of this paper at http;//journals.cambridge.org/ipg.

Individual target behaviours

The individual target behaviours selected for each participant from DMAS-17 are described in Table 4.

Statistical Analysis

Participants' behavioural scores were plotted for each bespoke DMAS-17 item. This visual analysis considered level, trend line and variability differences between phases A-B-C

(baseline, intervention and follow-up effects). A statistical analysis of the trends between Phase A and B was undertaken using Percentage of All Non-overlapping Data (PAND). PAND has been developed in the field of special education (Parker et al. 2007a), self-practice in Cognitive-Behavioural Therapy (Davis, 2008) and social skills in autistic children (Schneider et al., 2008).

PAND examines the number of observations from baseline overlapping with observations in the intervention (Parker and Hagan-Burke, 2007a; Parker and Hagan-Burke, 2007b; Parker et al., 2007). The objective is that the lowest data cluster (0) of the outcome measure is scored in Phase B.

A six step approach was applied:

- Step 1: Using the data from Participant J with 21 days baseline (see Figure 1-Low Self-Esteem) as an example, it can be seen that still data clusters (scores of 2 and 4) between the Phase A (baseline) and Phase B (intervention) are not "widely separated" and overlap is apparent. Overlapping data points are defined as the "minimum number that would have to be swapped across phases for complete score separation" (Parker et al., 2007, p.197). As there is no score in Phase A below 2, all the remaining scores in Phase B are non-overlapping. In this example "2" is the non-overlapping cut-off value.
- Step 2: Create spreadsheet to calculate PAND. To assess the number of overlapping data clusters (scores) for each participant, all observations were labelled in a spreadsheet (Microsoft Excel) as to whether they originated in Phase A or Phase B, and then were sorted into descending order of magnitude (i.e. higher: 6, 4, 2 and lower: 0). See Table S1 published as supplementary material online attached to the electronic version of this paper at http://journals.cambridge.org/ipg to follow this Self-Esteem example. This followed the observed downward trend where low self-esteem ratings appeared to be higher in the baseline phase and decreased during the intervention phase although the highest cluster for low self-esteem was observed during the intervention phase (day 56).

- Step 3: Obtain data from figure to calculate PAND. Once data had been sorted, data clusters would have to be swapped across phases to allow for a complete separation of scores. There were eleven observations scored during Phase B intervention (6, 6, 4, 4, 4, 4, 2, 2, 2, 2, 2) overlapping with Phase A (baseline). In Table S1 (scores in italics and bold), the example given with participant J's self-esteem ratings illustrates where a line is draw in order to allow complete separation of phases A and B, scores that were not "0" in Phase B (intervention). See Figure 1 and Table S2 published as supplementary material online attached to the electronic version of this paper at http;//journals.cambridge.org/ipg to follow this Self-Esteem example. PAND equals the remaining data (Higher scores in Phase A & Lower scores in Phase B) divided by the total data observations N: 21 + 73 = 94 /105= 90 % where 50% is chance level [meaning that only 40% of self-esteem data in self-esteem overlap] Parker et al. (2011) recommends rescaling PAND by the formula [(non-overlap / .5) – 1] to facilitate a comparison with more familiar indicators
- Step 4: Calculate Phi ("bona fide effect size") and confidence intervals. A further method of assessing significance of overlap is by using Pearson's Phi coefficient. To do this one must "balance the table" with the higher/lower values. Parker et al., 2007 recommends doing to provide a robust approach for small differences by equating the overlap diagonals: 0 + 11 = 11 / 2 = 5.5 (Lower scores in Phase A and Higher scores in Phase B). Then, a 2 x 2 table with the higher and lower scores of Phase A and B respectively for each behavioural/mood item was constructed using SPSS Version 17. These tables were generated to establish PAND and to provide a "bona fide" effect size for scores across phases A *vs.* B, which were entered into an online resource (Pezzullo, 2010 http://statpages.org/ctab2x2.html) to calculate Phi and its confidence intervals. See Table S2 published as supplementary material online attached to the electronic version of this paper at http://journals.cambridge.org/ipg to follow example.
- Step 5: Interpret effect size (magnitude of change). A major challenge in SCR is the need for interpretational guidelines for effect sizes (ES). Previous authors have warned on

differences in ES magnitudes according to study design, client and type of intervention (Rosnow and Rosenthal, 1989). In contrast to the interpretation of p-value significance, there is a "lack of effect size guidelines" in Single-Case Research (Parker and Brossart, 2003) and the usual effect sizes (small, medium, large) indicators developed by Cohen (1988) for common statistics do not apply and do not fit SCR data as the effect sizes are larger. The most appropriate ways of classifying effect size are derived from a sample of published SCR studies based on N=200 phase comparisons (Parker et al., 2011) to benchmark the magnitude of change for PAND and Phi in each participant (see supplementary Table S3 published as supplementary material online attached to the electronic version of this paper at http://journals.cambridge.org/ipg). An empirically derived criteria based on actual SCR was applied. It is ultimately an arbitrary set of cases selected by Parker and colleagues and it is likely to be biased towards larger effects because studies showing effects detectable by visual analysis are more likely to be published. Most published and unpublished SCR studies do not use statistics; smaller effects not clear through visual analysis are less likely to be published. The 95% confidence intervals (CIs) obtained for the Phi scores based on N=69 sample (Parker et al. 2007c) were as follows: 10^{th} percentile [-.02<. 22<. 44]; 25% percentile [.26< .51< .68]; at 50^{th} percentile [.47< .68< .82]; at 75^{th} percentile [.71<. 86<. 94] and at 90^{th} percentile [.79<. 94<. 99]. This was considered a better alternative to inappropriate use of Cohen's conventional effect sizes for SCR.

- Step 6: To obtain a summary of the intervention effectiveness, we completed two meta-analysis to aggregate the effect size of treatment across all the participants, one for mood and one for behaviour. Parker and Vannest (2012) and Burns (2012) suggest conducting meta-analysis to provide an overall summary of the effect of the intervention in SCR. We aggregated the DMAS-17 for each participant with the most severe items from both the categories of mood and behaviour at Phase A. It was meant by "severe" those items that scored the highest data clusters at baseline. Then the effect sizes derived from each participant's individualised items were combined and computed using the WINPEPI

programme COMPARE2.EXE (Abramson, 2011), a procedure for comparison of two independent groups or samples (http://www.brixtonhealth.com/pepi4windows.html) by entering the Phi coefficients obtained for the mood and behaviour related items.

Results

No differences were found with care homes cognitive assessment notes and the applied MMSE for this study. The average number of DANCIN sessions completed were 20 in each setting. Three out of 10 participants attended between 50-70%, and seven out of 10 attended 71-100% of the sessions. During Phase B, three participants (A, F, I), who were initially dancers, became physically unwell owing to some comorbid conditions, e.g. cancer, breathing difficulties and decided to participate by observing (participants A, F, I). Based on the findings of a previous pilot study (Guzmán-García et al., 2012b), a decision was taken to consider them as "observers" and analyse the effect of DANCIN on their selected individualised items. In phase C (follow-up), data collection was interrupted in three participants (A, D, E) owing to health events. Findings show a positive trend, with decreasing difficult behaviours and increasing positive mood. Participants showed more fluctuations in Phase A and less in Phase B. Results based on the statistical analysis of the DMAS-17 scores, indicated a small to medium improvement in 21 out of 32 mood/behaviour items; eight items showed no change and three items in one case showed adverse effects. Table 5 shows participants' results.

During non-DANCIN days, staff observed and interpreted residents' mood and behaviour according to residents' daily events, which included grief and attendance to a funeral in connection with a fellow resident (See Figure.1 Participant C; phase B days 5-8 and 26-27 data clusters). Related individual mood variables, which were aggregated using WINPEPI, to give an average effect of DANCIN across all participants regardless of their observer/dancer role. Results showed an overall average Phi of 0.24 (95% C.I: 0.17 to 0.30), indicating a statistically significant intervention effect that is considered to be small in magnitude compared to published SCR research. See Table S4 published as supplementary material online

attached to the electronic version of this paper at http://journals.cambridge.org/ipg. The related behavioural items were aggregated using WINPEPI, and the weighted average PAND was 0.28 (95% C.I: 0.23 to 0.34) indicating a statistically significant small to medium magnitude intervention effect See Table S5 published as supplementary material online attached to the electronic version of this paper at http://journals.cambridge.org/ipg. Figure 1 shows some examples at different baselines to illustrate the individual self-esteem and depressed appearance trend and Figure 2 for individual examples of the irritability item. Figure S2 for additional results of individualised items, published as supplementary material online attached to the electronic version of this paper at http://journals.cambridge.org/ipg for other measured items. No falls were reported during the study and participants remained stable on their medication, except for Participant D whose psychiatrist prescribed Haloperidol owing to aggressive behaviour following an Urinary Tract Infection (UTI) during Phase B at day 65 and dying later during Phase C.

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Discussion

This study is part of a series of investigations examining the development of a Psychomotor Dance Therapy Intervention, DANCIN. A small to medium change was seen in both behavioural and mood items, such as energy levels to socialise, increase in appetite, decrease in irritability and depressed appearance. Some of the male participants (A, E, J) with a tendency to be irritable, apathetic and socially withdrawn, showed enhanced energy levels and decreased irritability. This might be because care homes had activities such as art-and-craft or bingo which were not as appealing to men as to women. Male residents may have found DANCIN more engaging to their interests and felt valuable as dance partners being preferred by fellow female participants. In line with a study of 13,715 people between 13 and

86 years (Lovatt, 2011), dance confidence in men is linked with self-esteem based on the individual's perception of the opinions and perceptions of other people. Self-esteem was measured in a female participant D and male participant J, who showed a positive change. The impact of the Danzón Latin ballroom music used in DANCIN seems to trigger positive emotion, which has been described as "Happy music" in the grounded theory study (Guzmán-García et al., 2012b).

This study showed that residents with either sensory deficits such as hard of hearing (Participant F), or no previous dancing experience (C, J) could be included in DANCIN to prevent isolation. Participants, whose mobility was compromised by comorbid illnesses such as cancer or pain, wanted to take part by observing and chair-moves were adapted. The two observers of this study found small to medium change improvement in behaviour and mood items. Calvo-Merino et al., (2008) research on dance observation has demonstrated the emotional benefits in observers without cognitive impairment. This study is consistent with the previous grounded theory model (Guzmán-García et al., 2012b) where both residents with dementia and staff recognised a benefit for residents observing the session. It is also similar to a previous Finish dance study with dementia participants who reported a positive impact while observing a dance session (Ravelin et al., 2013). However, our study found one observer with regular dance experience in his youth (Participant I) showing negative effects. Participant I displayed an increase in irritability, low self-esteem, and spoke of guilty feelings concerning being a smoker in his youth. Of note, this participant only attended 50% of DANCIN sessions, owing to breathing difficulties.

Strengths and Limitations

The strength of the study lays in its innovative nature. Using the multiple-baseline single-case method allowed participants to be their own control to reach about the likely effect of DANCIN between Phase A and B. We have been able to show the specific ways in which the intervention was beneficial or not for each person. We have been able to show the specific

ways in which the intervention was beneficial or not for each person. Our research has also shown that it is possible to engage with care settings with no previous dance exercise and encourage this type of body oriented Psychological Therapy to potentially treat residents' behaviour and mood. A spin-off from the research was the effect on training care staff in the use of a psychosocial treatment. Involving service-users on this MRC-Phase I appears to have made staff reflect on residents' mood and behaviour, and how DANCIN can enrich the care home social environment. Regarding limitations, it may be a concern that the first author led DANCIN sessions with support from trained staff. However, it is important to recognise that this was a real-world study, with limited resources, and therefore some of the biases could not be controlled for due to funding limitations. In the follow-up study, we will ensure that the first author is not involved in data collection. Precaution was taken to minimise bias when trained staff had to complete the behaviour diaries and had to additionally dance when no other staff member was available.

Another limitation was the lack of measures of inter-rater reliability in connection with the daily data collection. James et al. (2007) found that staff are not always reliable informants, and further training on the use of scoring sheets would have improved reliability. To ensure consistent DMAS-17 scoring, staff were trained and a consensus in each care home was carried out on how to rate the items according to their observations. Overall, it was preferred to have realistic observations of "day to day actions" from a senior care staff member familiar with participants' behaviour. Ten senior staff members provided scores only, whilst eighteen scored and danced. This might have biased the scoring in favour of being overly positive. To compensate for this possible bias, an external researcher conducted an evaluation after Phase B was completed with additional comments for further DANCIN development. These quantitative findings will be published elsewhere.

Implications for future research in Dementia clinical practice

This study has helped to build up evidence regarding the development of DANCIN as a therapy for those with cognitive impairment and physical frailty. A preliminary manual and poster with the main futures of the session were developed at the end of the study. This manual will be applied in the future studies and used to implement a consistent programme of DANCIN. The study findings allow us to estimate effect-sizes (small to moderate magnitude of change), enabling us to establish the numbers of participants required in controlled and randomised control trials. The work has also been useful in identifying outcome measures to understand the impact of the intervention on resident and staff well-being. As part of such future investigations, we intend to examine the training and supervising of staff with the aim of implementing the DANCIN sessions as part of their standard therapeutic input. Future outcomes will be chosen and analysed in line with Psychological Processes and Behaviour Change Techniques Frameworks (Michie et al., 2013).

Conclusion

This study supports the growing evidence of body oriented Psychological Therapies in mild and moderate stages of dementia. DANCIN sessions were able to adapt to loss of mobility during the course of the study through chair-based participation and observation. Data suggest that the intervention could be used to decrease irritability or depression, increase self-esteem, important factors for positive mood in dementia. Overall, this intervention showed reduction in terms of social isolation in residents previously described as socially withdrawn. The study demonstrates both an innovative single-case methodology and form of analyses (e.g. PAND). Whilst this study was conducted in a particular region of England, it involved two care homes and one nursing home, strengthening its validity. Hence, the effects of DANCIN were not limited to a particular care home environment or specific dance group but were unique to the individuals.

Conflict of interest

None

Description of author's roles

This study was undertaken by Azucena Guzmán in partial fulfilment of the requirements for her PhD. Professor Julian Hughes, Professor Lynn Rochester and Professor Ian James provided expert advice and supervision of the research, practical support during the delivery of the dance-based exercise. Professor Mark Freeston provided expert advice on the measurement, statistical analysis and presentation of the single-case methodology. All of the authors contributed to the design of the project and to the writing of the paper, on which Azucena Guzmán took the lead.

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Table 1. Residents' demographics

Participants	Age	Gender	Years of education	Dementia Diagnosis	MMSE	Tinetti	Baseline length (Days)	Attendance	Medication
A (ob)	95	M	12	AD	20	23/28	42	19/ 24 (7 dancer - 17 observer)	*No medication*.
B	87	F	12	VaD	24	27/28	42	14/ 24	56 Adcal-D3; Alendronate sodium; Aspirin; Codeine phosphate tablets; Paracetamol; Persantin Retard capsules.
C	89	F	9	AD	24	28/28	42	23/ 24	Donepezil; Citalopram; Atenolol; Bendroflumethiazide
D	78	F	9	AD	13	28/28	35	20/24	Donepezil; Duloxetine gastro resistant capsules; Paracetamol.
E	85	M	9	Unspecified	26	28/28	35	20/24	Docusate Sodium; Metformin; Paracetamol; Quinine Sulphate; Simvastatin; Lisinopril; Warfarin sodium.

F (ob)	92	F	9	AD	16	21/28	35	15/24 (4 dancer – 11 observer)	Alendronate Sodium; Calcium Carbonate with Colecalciferon; Ferrous sulphate; Furosemide tablets; Levothyroxine; Mirtazapine; Omeprazole; Paracetamol; Simvastatin; Zopiclone: Clenil modulite inhalator; Ventolin.
G	87	F	9	AD	24	25/28	28	19/24	Aacar; Aspirin; Atenol; Citalopram; Donepezil; Fenofibrate Hicronised capsules; Ferrous Sulphate; Furosemide; Isosorbide Monitrate; Omeprazole Gastro; Resistant capsules; Paracetamol.
H	*82*	F	9	AD	14	25/28	28	23/24	Bendroflumethiazide, Calcium carbonate; Citalopram; Donepezil hydrochloride; Lacidipine; Lansoprazole, Clotrimazole hydrocortisone, Lisinopril, Simvastatin emulsifying.

I (ob)	*81*	M	9	AD	27	28/28	28	12/24 (1 dancer -11 observer)	Aspirin, Inhalers: Tiotropium, Fluticasone-salmeterol; Salbutamol.
J	82	M	9	AD	17	26/28	21	20/24	Aspirin; Atenolol; Calcium Carbonate; Galantamine Isosorbide; Mononitrate; Trimethropim; Glyceryl Trinitrate; Simvastatin

Table 2. Staff's demographics

	Home-1	Home-2	Home-3
STAFF			
Female	2	10	10
Male	8	0	2
Age	39.5 ±17.32 (range 23-69)	43.90 ±13.27 (range 22-60)	34.25± 12.64 (range 17-58)
Ethnicity			
White British	9	10	10
White European	1	0	1
Asian Indian	0	0	1
Job Occupation			
Junior Staff	6	4	6
Senior Staff	0	3	2
Nurse	0	0	1
Activity Coordinator	1	2	1
Management Staff	1	1	2
Proprietor (Retired Nurse)	1	0	0
Housekeeping/Kitchen staff	1	0	0
Staff Role during study:			
Danced/scored	3	1	0

Observed/scored	0	5	5
Only danced	6	3	4
Only observed	1	1	3

Staff training

Higher Education	1	0	2
NVQ 1,2,3,4 (a)	3	1	0
Dementia Awareness	0	6	7
Miscellaneous Qualification	1	0	0
No formal training	5	3	3

Table 3. Key features of Psychomotor DANCE Therapy INtervention (DANCIN) session

Units	**Strategies**
Warm up (10 minutes)	• In a group circle [modify to chair-based moves for observers] combine stretches and mobilisers. Danzón steps are introduced through implicit cues (*)
Danzón practice (10 minutes)	• Show mnemonic aids to cue steps prior to each session. • Set in pairs, dancers repeat choreography x 4 times minimum: 1st Danzón entrance: dancers hold hands standing next to each other 2nd Dancers face and counterbalance in an embrace 3rd Danzón choreography options in four tempos: - box step - side to side step 4th Pair take turns to perform a twirl and combine with steps above (quicker part of the song) (*)
Danzón-free style (5 minutes)	Guided by staff, participants exchange dance partners and dance freely to Danzón music
Cool Down (5 minutes)	• Set in group circle (including the observer-residents) combine stretches and mobilisers less energetically and taper to stillness and relaxation. • Session closure by praising dance group participation (*) • Feedback the session experience, thoughts, reactions, body sensations and feelings.

Table 4. Individual target behaviours

DMAS- item	A	B	C	D	E	F	G	H	I	J
Sleep	Insomnia: wakes up during the night	Insomnia: wakes up at night to go to the toilet and finds difficulty in getting back to sleep								
Daytime drowsiness	Drowsy in the morning	Daily naps and falls asleep while reading the newspaper								
Energy	Apathetic and likes to nap after breakfast and lunch; does not want to engage with any activity	Shows apathy and does not want to participate in activities, usually replying: “because I don’t feel like doing anything” or “I’m not in the mood”								
Physical agitation	When awake, constantly fidgeting and staring at the floor and asking repetitive questions such as “What time is it?”; “Is it nearly lunch time?”					Walks around corridors during morning hours		Agitated when cannot go out for walks		

Lack of sense of enjoyment	In occasions plays dominoes and sings, but no sense of pleasure when socialising									
Irritability		Daily irritable outburst with other residents if disturbed during participant's napping or reading in the lounge or on days where felt tired after a blood transfusion	Get angry outbursts if lights are on or TV volume is high, causing disturbance to other residents		Verbal aggressive outbursts towards staff	Verbally or physically aggressive with the staff during personal care	Gets irritated with other residents, if they are screaming in the lounge or when asked to wash herself by staff	Becomes irritable and shows low tolerance to other residents behaviours, described as a "mother role type" who likes to nurture other residents by helping them to get dressed. This is considered to be disturbing to others. Gets irritable when finding difficulty in communicating with others	Gets irritable with other residents during meal times	Impatient with staff and other residents. Does not like to be reminded of what to do (e.g. if asked to switch off the TV to join dinner)
Anxiety			Anxious if staff do not allow her to go to the garden	Wants to go home and starts packing belongings after meals; keeps asking questions such as "When can I go home?"						
Depressed appearance			Looks sad and upset on rainy days, which prevent resident going into the garden	Diagnosis of depression, resident has a sad appearance and rarely smiles			Looks sad, and tells staff desire of going home or that "she is not in good spirits"			

Decreased appetite				Poor appetite, despite staff providing 'finger food' and help with cutting food	Described as a 'fussy' eater, as the resident does not like the home's food	Only eats small portions and feels sick after eating			Poor appetite owing to his breathing problems and constant coughing during meal times	
Low self-esteem				Feels like doing wrong things all the time, very apologetic and keeps saying "oh sorry, I didn't mean to"						Unable to be proud of his strengths. Resident is 'apologetic' for his emotional reactions
Self-directed motor activity					Needs to be prompted several times to participate in activities or join the dining room for his meals. Resident prefers staying alone in his room, occasionally plays dominoes					

Guilt feelings									Continuously talks of regretting smoking when younger causing him problems with his asthma at old age	
Emotional response										Socially withdraws; avoids eye contact with residents/staff; often says that he is feeling sad; shows regular and sudden crying outbursts about the past and recalls his mother often

Table 5. Participants' PAND results

Participant	Baseline	Worsening	No Change	Small	Medium	Large	Number of variables showing improvement
A	6 weeks		-Daytime drowsiness -Lack of Energy -Agitation - Lack of sense of Enjoyment	- Sleep (Insomnia)			**1/5**
B	6 weeks		-Daytime drowsiness -Lack of Energy		- Sleep (Insomnia) -Irritability		**2/4**
C	6 weeks				-Irritability -Anxiety -Depressed Appearance		**3/3**
D	5 weeks		-Anxiety	-Depressed Appetite -Self-esteem			**3/ 4**

				-Depressed Appearance			
E	5 weeks			-Self-Direct Motor activity	-Decreased Appetite -Irritability		**3/3**
F	5 weeks		-Decreased appetite	-Irritability	-Physical Agitation		**2/3**
G	4 weeks				-Irritability -Depressed Appearance		**2/2**
H	4 weeks				-Irritability -Physical Agitation		**2/2**
I	4 weeks	-Irritability -Decreased appetite -Guilt-feelings					**0/3**
J	3 weeks				-Irritability -Emotional response -Self-esteem		**3/3**